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**WO 03/046393 A1**

(54) Title: **PLASTIC RETAINING CLIP FOR RIB ATTACHMENT**

(57) Abstract: A resilient clip for engaging a structure and having a body portion with a pair of top flanges, a pair of fastening members and a pair of abutting flanges. Each of the fastening members has a base portion that is coupled to an associated one of the top flanges. Each of the abutting flanges has a locking fingers which engages the mounting structure. Finger flange portions are configured to engage a first side of a mounting on an interior trim component.

## TWO-PIECE FASTENER FOR COPLING A FLANGED COMPONENT TO AN APERTURE

## TECHNICAL FIELD

[0001] The present invention relates generally to resilient clip fasteners  
5 and more particularly to a resilient clip fastener that employs a two piece  
geometry to secure the body portion of the resilient clip to a structure. More  
specifically, the present invention relates to a resilient clip fastener having a  
construction that utilizes a plastic body portion which is coupled to a metal  
retainer having abutment flanges to couple of an attachment flange. The  
10 invention also relates to a resilient clip fastener having a construction that  
accounts in several manners for part-to-part variation between the structures  
that are to be fastened together.

## BACKGROUND OF THE INVENTION

[0002] Many current vehicles employ resilient clips to secure various  
15 components to the vehicle body. One such application concerns interior  
panels that mount to the interior of the vehicle such as on the doors. Such  
panels serve not only to provide occupants with a convenient point to grasp  
during ingress to and egress from the vehicle, but also provide energy  
absorption during a crash event.

20 [0003] During assembly of the vehicle, it is conventional procedure of  
the entire panel assembly to be installed onto the interior of the vehicle in a  
single operation. In other words, the panel assembly is passed through either  
the windshield or backlight opening of the vehicle body on the assembly line  
and then the panel assembly is secured by line operators to the interior of the  
25 vehicle.

[0004] In order to accomplish this assembly task, the panel assembly  
is typically equipped with numerous fasteners, located around the periphery of  
the panel assembly as well as at predetermined locations around the interior  
area of the panel, that are adapted to penetrate through corresponding holes  
30 located in the reinforcing sheet metal members of the vehicle interior. It is the  
responsibility of the line operators to properly orient the panel assembly  
adjacent the interior of the vehicle and press the fasteners into the various

mounting holes in the reinforcing sheet metal members to secure the panel assembly to the interior of the vehicle.

5       [0005] For aesthetic reasons, the panel fasteners are typically secured in some fashion to the backside of the panel so that they are not visible from the interior of the vehicle after the panel assembly is installed. Consequently, it is often incumbent upon the line operators to blindly "feel" for the location of the mounting holes with their fingers before pressing the fasteners into the holes from the opposite show-surface side of the panel.

10       [0006] Due to slight misalignments, which can occur between the fasteners and their corresponding mounting holes, some of the fasteners may not be properly seated and secured to the sheet metal.

15       [0007] Accordingly, there remains a need in the art for an improved fastener having a relatively low installation force and a relatively high removal force that is relatively more tolerant of misalignment problems. Ideally, the fastener should be inexpensive to manufacture, reliable and simple to install. Furthermore, the fastener should be particularly adapted for securing structures to one another in a manner, which minimizes vibration, and the concomitant noise problems that are often associated with such fasteners.

#### SUMMARY OF THE INVENTION

20       [0008] In one preferred form, the present invention provides a resilient clip for engaging a structure. The resilient clip includes a body portion having a coupling region, a metal retainer is coupled to the coupling region. The metal fastener a pair of fastening members an abutting flange. Each of the fastening members are coupled by a base portion that is coupled to an associated top flange. The abutting flange has fingers that engages the mounting structure.

#### BRIEF DESCRIPTION OF THE DRAWINGS

30       [0009] Additional advantages and features of the present invention will become apparent from the subsequent description and the appended claims, taken in conjunction with the accompanying drawings, wherein:

      [0010] Figure 1 is a front view of a fastener constructed in accordance with the teachings of the present invention;

[0011] Figure 2 is a side view of the fastener of Figure 1;

[0012] Figure 3 is a top view of a portion of the fastener of Figure 1 illustrating the spacing of the structures in greater detail;

[0013] Figures 4a and 4b are perspective views of the fastener shown  
5 in Figure 1;

[0014] Figure 5 is a side view of a second embodiment of the present invention;

[0015] Figure 6 is a front view of the two-piece fastener shown in Figure 4;

10 [0016] Figure 7 is a top view of the fastener shown in Figure 5; and

[0017] Figures 8a and 8b are perspective views of the fastener shown in Figure 5.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] Referring to Figures 1 through 4b, a two-piece fastener 20 in  
15 accordance with the present invention is disclosed. The two-piece fastener 20 is defined by a plastic body portion 22 and a metal retainer 24. Integral with the metal retainer 24 are pairs of locking fingers 26 and 27 disposed on abutting flanges 28 and 29 which are used to couple the two-piece fastener 20 to a mounting flange 31 of trim component (not shown). Additionally, the body  
20 portion 22 has a locking portion 30 which is formed by two sets 32 and 34 of three locking members 36, 38, 40. The two sets 32 and 34 of three locking members 36, 38, 40 are coupled together at a proximal end 42 by an angled or wedge-shaped member 44. The two sets 32 and 34 of three locking members 36, 38, 40 are coupled together at a distal end 46 by a sealing umbrella portion  
25 48. Each of the three locking members 36, 38, 40 define retaining snap in teeth 50 which facilitate the coupling of the plastic body portion 22 to a sheet metal structure 51.

[0019] The umbrella portion 48 functions to seal the mounting hole 53 in the sheet metal structure 51 and is formed of an oval planar portion 49 which is  
30 surrounded by a generally oval deformable portion 55. The teeth 50 are configured to pull the deformable oval portion onto the sheet metal 51.

[0020] Coupled to the distal end 46 and disposed on the sealing umbrella portion 48 is a retaining flange 52 which functions to fluidly seal the aperture. Cut into the retaining flange 52 is a slot 54 which couples to a metal flange 56 on the metal retainer 24. Disposed within the slot 54 is a pair of members 58 which facilitate the frictional engagement of the slot 54 with the metal flange 56.

[0021] Generally, the abutting flanges 28 of the metal retainer 24 are defined by three portions. The first portion 60 is defined by a planar engaging surface 62. Disposed on the planar engaging surface 62 is a first pair of engaging fingers 64 and 66, which point toward the proximal end of the body portion 22. The first portion 60 further has an angled insertion portion 68 which facilitates the insertion of the mounting flange 31. The second and third portions 70 and 72 are coplanar and defined by planar engaging surfaces 74 and 76. Each of the planar engaging surface 74 and 76 are generally parallel to the first portion 60 and have a pair of engaging fingers 78 and 90 which function to fix the mounting flange within the metal retainer 24. The engaging fingers of the first embodiment point generally toward the proximal end of the body 22 and act in conjunction with the engaging fingers 64 to clasp the mounting flange 31. The first portion 60 further defines a transition member 92 which couples the first portion to the metal flange 56 on the metal retainer 24. Disposed between the first portion 60 and the second and third portions 70 and 72 is a curved coupling region 71. The curved coupling region 71 functions as a spring member and biases the first through third portions 60, 70, 72 together.

[0022] Referring generally to Figures 5 through 8b which depict views of a two-piece fastener 93 according to the teachings of a second embodiment of the current invention. Shown is a second type of metal retainer 94 coupled to the plastic body portion 22. The metal retainer 94 is generally S-shaped and has a pair of abutting flanges 96 and 98. The first abutting flange 96 has two pair of parallel fingers which engage the mounting flange 31 of a trim component. Both abutting flanges 96 and 98 have angled portions 102 and 104 which function to guide the mounting flange 31 between the abutting flanges 96 and 98. The metal retainer 94 includes a c-shaped flange 106 which is

configured to be elastically deformed so that it can couple to a plastic flange 108 on the umbrella portion 48 of the plastic body portion 22. The plastic flange 108 has a tooth portion 110 which engages an engaging finger 112 on the c-shaped flange 106.

5           **[0023]** Figure 5 is a side view of the two-piece fastener 93 and shows the relationship of the abutting flanges 96 and 98 to mounting flange 31. As can be seen, the metal retainer 94 defines an upper keyhole slot 46 which facilitates the displacement of the abutting flanges 96 and 98 when the mounting flange 31 is inserted. The umbrella portion 48 of the plastic body portion 22 further has a  
10 stop 114 defined thereon. The stop additionally functions to prevent rotation of the metal retainer 94 with respect to the body portion 22. The stop is configured to limit the amount of insertion of the mounting flange 31. Further depicted is the angular relationship of the c-shaped flange 106 which couples to a plastic flange 108.

15           **[0024]** Figure 6 depicts a front view of the two-piece fastener 93. Shown is the first abutting flanges 96 and 98 which have two pair of parallel fingers 104 and 106 which engage the mounting flange 31. Both abutting flanges 96 and 98 have angled portions 102 and 104 which function to guide the mounting flange 31 between the abutting flanges 96 and 98. The interior convex surface 50 of the  
20 abutting flange 98 is configured to engage mounting flange 31 to hold the trim component in place. Also depicted is the interior surface 57 of the finger members 105 and 106, which engage the surfaces of the mounting flange 31.

**[0025]** The foregoing discussion discloses and describes exemplary embodiments of the present invention. One skilled in the art will readily  
25 recognize from such a discussion, and from the accompanying drawings and claims that various changes, modifications, and variations can be made therein without departing from the spirit and scope of the invention.

## CLAIMS

What is claimed is:

1. A fastener for coupling a flanged component to an aperture  
5 comprising:  
a body portion having a locking portion configured to be mated  
with the aperture, said body portion having a retaining flange;  
a metal retainer comprising an engagement member coupled to  
the retaining flange and a pair of generally parallel locking flanges, at least one  
10 of the locking flanges having a locking member, the locking member configured  
to releasably engage the flanged component.
2. The fastener according to Claim 1 wherein the body comprises an  
umbrella member coupled to the retaining flange, the umbrella member being  
15 configured to fluidly seal the aperture.
3. The fastener according to Claim 1 wherein the locking portion  
comprises a plurality of deformable members, each member defining a tooth  
configured to engage the aperture.  
20
4. The fastener according to Claim 3 wherein the deformable  
members are coupled to the umbrella member.
5. The fastener according to Claim 3 wherein the deformable  
25 members are coupled to a wedged-shaped portion.
6. The fastener according to Claim 1 wherein the retaining flange  
defines a tooth portion configured to mate with the metal retainer.
- 30 7. The fastener according to Claim 6 wherein the metal retainer  
defines an engagement finger configured to engage the tooth portion.

8. The fastener according to Claim 1 wherein the retaining flange defines an aperture configured to releasably engage the retaining flange.

9. The fastener according to Claim 1 wherein the metal retainer  
5 comprises a generally c-shaped flange configured to engage the retaining flange.

10. The fastener according to Claim 6 wherein the metal retainer comprises a generally c-shaped flange configured to engage the tooth portion.

10

11. A fastener for coupling a flanged component to an aperture defined in sheet metal comprising:

a body portion comprising a locking portion configured to mate with the aperture, and an umbrella portion, said umbrella portion defining a  
15 retaining flange; and

a metal retainer comprising a pair of retention flanges, at least one of said retaining flanges defining an angled insertion portion, and at least one of said retention flanges having a retaining finger configured to engage the flange of the component.

20

12. The fastener according to Claim 11 further comprising a c-shaped flange configured to mate with the retaining flange.

13. The fastener according to Claim 11 wherein the retaining flange  
25 defines an aperture configured to releasably engage the retaining flange.

14. The fastener according to Claim 11 wherein the retaining flange comprises a tooth.

15. The fastener according to Claim 11 wherein the locking member  
30 defines a plurality of deformable flanges, at least one of the deformable flanges defines a tooth configured to mate with the aperture.



16. The fastener according to Claim 15 wherein the deformable flanges are coupled to the umbrella portion.

5 17. The fastener according to Claim 15 wherein the deformable flanges are coupled by a wedge-shaped member.

18. A fastener for coupling a flange component to an aperture comprising:

10 a body portion defining a locking portion and an umbrella portion, the umbrella portion defining a retaining member, the retaining member defining a tooth;

an s-shaped metallic retainer comprising a pair of generally parallel retaining flanges, the retaining flanges defining an angled insertion portion and at least one retention tooth, the metallic retainer further having a c-shaped flange configured to engage the retaining member of the body portion.

15

19. The fastener according to Claim 18 wherein the body portion comprises a stop configured to limit the insertion of the flange of the component.

20

20. The fastener according to Claim 18 wherein the umbrella defines a generally oval base and an oval deformable portion.

21. The fastener according to Claim 19 wherein the stop restricts the movement of the s-shaped metallic retainer.

25

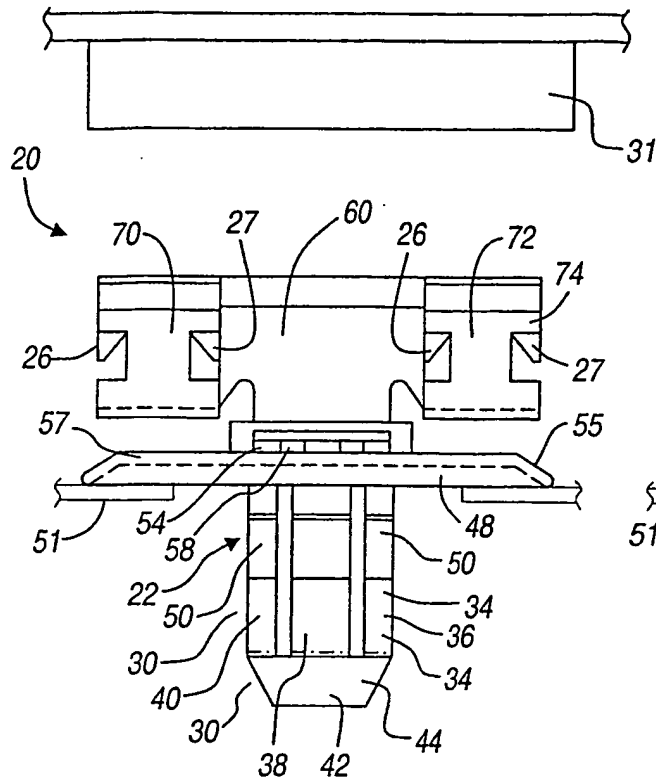


FIGURE 1

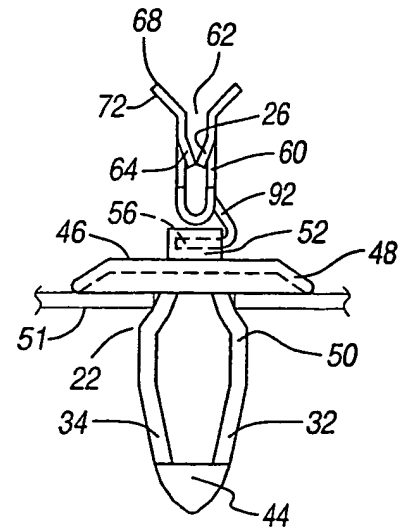


FIGURE 2

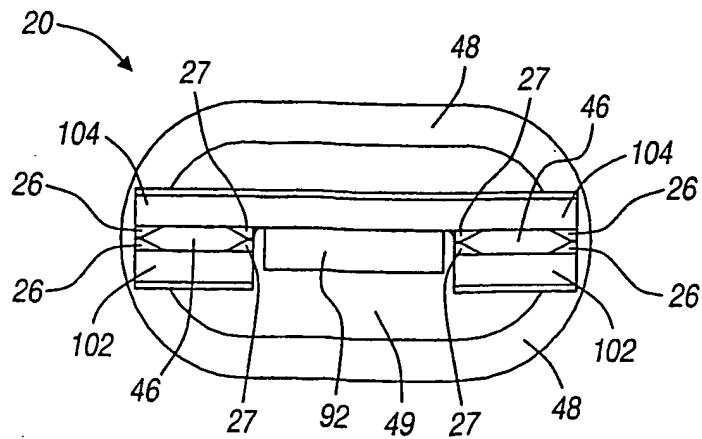


FIGURE 3

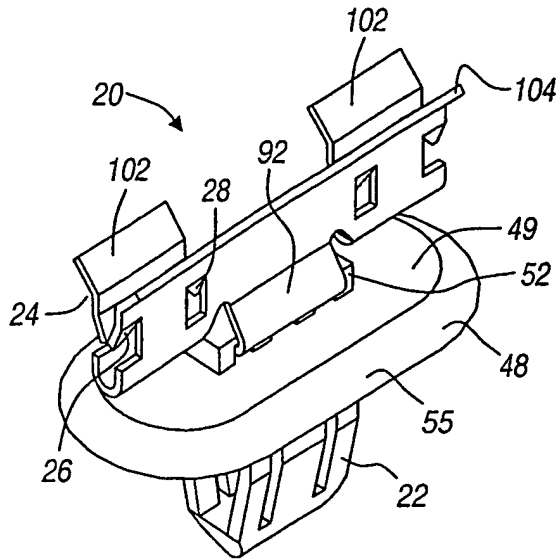


FIGURE 4A

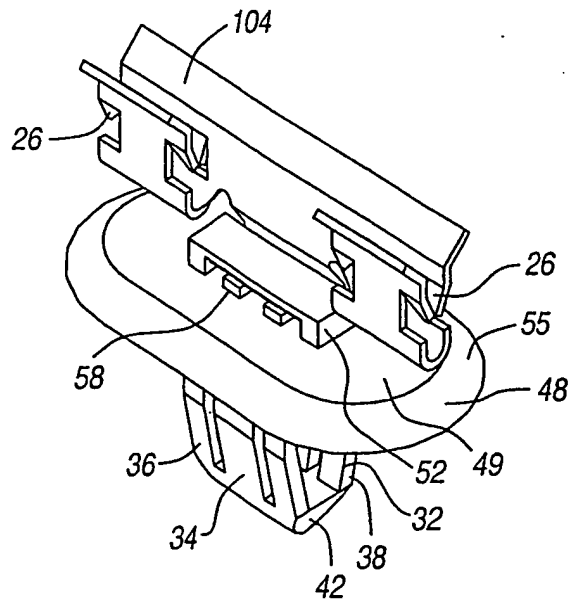


FIGURE 4B

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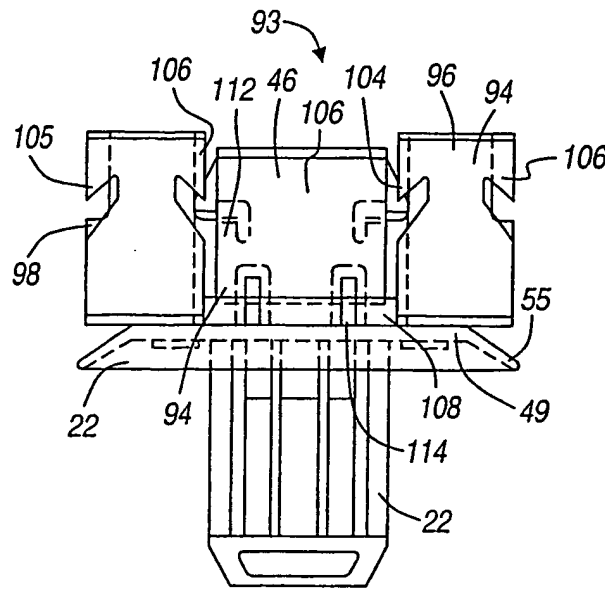


FIGURE 6

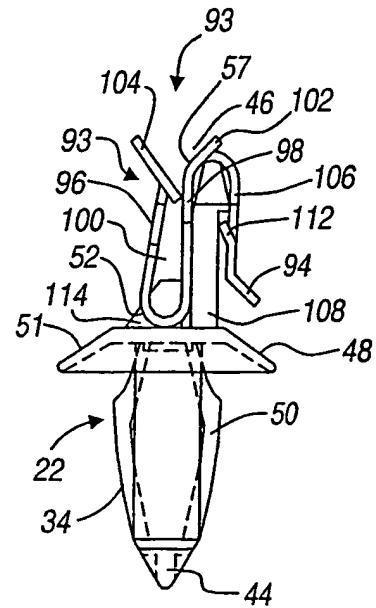


FIGURE 5

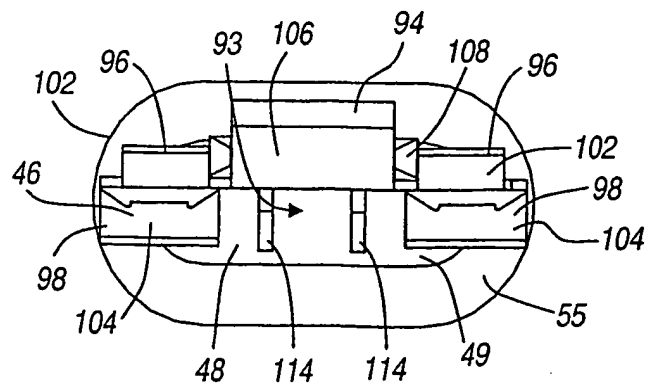


FIGURE 7

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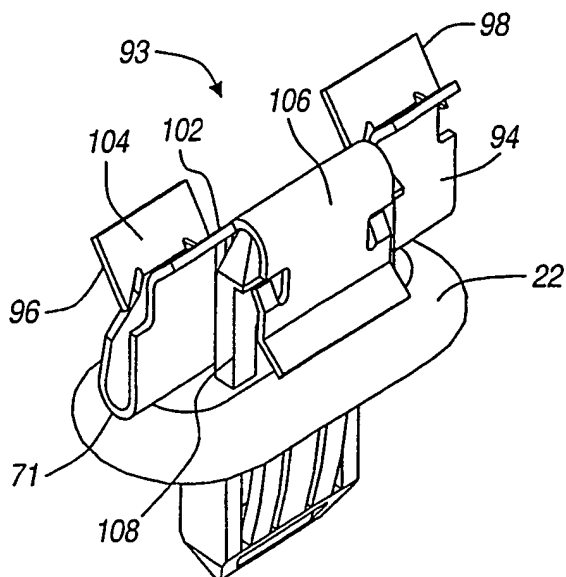


FIGURE 8A

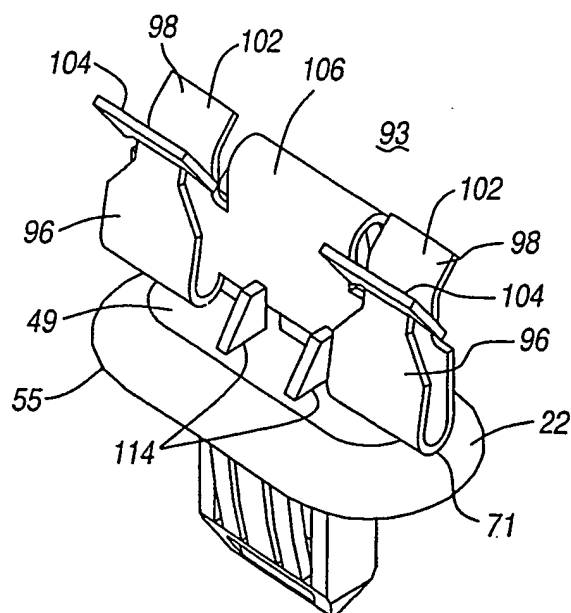


FIGURE 8B

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/37388

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 F16B5/06 F16B5/12

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F16B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 865 505 A (OKADA SHIGEO) 12 September 1989 (1989-09-12)  abstract; figures 1-3B	1-7, 9-12, 14-17
A	---	18,20
X	US 5 533 237 A (HIGGINS LAWRENCE J) 9 July 1996 (1996-07-09) column 2, line 30 -column 3, line 29; figures 1-3	1-7,11, 15,16
A	---	18,20
X	FR 2 690 487 A (COMET) 29 October 1993 (1993-10-29) abstract	1,3,6,7, 9,10
A	-----	11,12, 14,15,18



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents:

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Date of the actual completion of the international search

17 March 2003

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/37388

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4865505	A	12-09-1989	GB	2201723 A , B	07-09-1988
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